WELD-WELDING TECHNOLOGY (WELD)

WELD 1110. Introduction to Welding Fundamentals
3 Credits (2+2P)
This course focuses on the fundamental techniques employed in the welding field. It is a laboratory approach to understanding and building skills in welding related areas including shop safety, hand and portable power tool usage, and welding.
Learning Outcomes
1. Demonstrate knowledge of basic welding processes.
2. Demonstrate shop safety including the proper use of welding hand and machine tools.
3. Practice and demonstrate SMAW with various electrodes in all positions.

WELD 1120. Print Reading for Welders
3 Credits (3)
Provides students with the knowledge to read and interpret prints and welding symbols and transfer this knowledge to the workplace with layout tools and measuring instruments.
Learning Outcomes
1. Identify, read and follow AWS welding symbols.
2. Demonstrate the ability to interpret orthographic and isometric drawings.
3. Demonstrate the ability to read/interpret pipe welding drawing and schematics.
4. Demonstrate proficiency in the mathematics utilized in welding and fabrication.

WELD 1130. SMAW (Shielded Metal Arc Welding) I
6 Credits (3+6P)
This course will cover introductory theory and practical applications of structural plate welding, welding safety, handheld torch cutting operations and equipment set up. The development of student skills using the Shielded Metal Arc Welding process in all positions will be stressed. The standards of this course are set by the American Welding Society and utilized in both classroom study and laboratory work.
Learning Outcomes
1. Perform welds on various joints in all positions.
2. Perform welds on various joints in all positions.
3. Demonstrate proficiency in identification of electrode classification and proper storage.
4. Identify SMAW power sources and their characteristics.
5. Maintain, use, and safely operate SMAW equipment.

WELD 1140. GMAW-Gas Metal Arc Welding I
3 Credits (2+2P)
Introduces Gas Metal Arc Welding (GMAW) short circuit welding safety, machine set up and shutdown procedures. Topics include personal protective equipment (PPE), GMAW uses, advantages and disadvantages, constant voltage (CV) power source, polarity, electrode types, shielding gasses, and weld discontinuities and defects identification and corrective practices. Lab exercises will include various joints in all positions.
Learning Outcomes
1. Demonstrate the ability to safely operate the Gas Metal Arc Welding equipment.
2. Demonstrate Gas Metal Arc Welding theory and application.
3. Demonstrate the ability to perform Gas Metal Arc Welding on various joints in all positions.
4. Demonstrate the ability to fabricate assigned projects while applying proper tolerance to finished projects.

WELD 1155. GTAW-Gas Tungsten Arc Welding I
3 Credits (2+2P)
A basic course designed to provide the student with the ability to setup, maintain and operate Gas Tungsten Arc Welding (GTAW) equipment safely. Develop skills to weld structural joints to bend tests standards utilizing various metals. Weld quality will be measured in accordance with American Welding Society standards.
Learning Outcomes
1. Demonstrate the ability set up GTAW equipment for use, inspect equipment prior to use, perform minor maintenance, and identify potential hazards.
2. Demonstrate the ability to perform GTAW on various base metals in all positions.
3. Demonstrate the understanding of basic metallurgical differences in various base and filler metals.
4. Demonstrate an understanding of welding currents and power sources.

WELD 1171. Layout and Fabrication
3 Credits (1+4P)
This class is an introduction to general layout and fabrication techniques as related to structural welding. Emphasis will be on construction of small projects to tolerances using prints. A variety of welding processes will be used in all positions.
Prerequisites: WELD 1130, WELD 1120, WELD 1140, and OETS 104 or OETS 118.
Learning Outcomes
1. Demonstrate the ability to fabricate projects.
2. Use shop drawing and/or prints to create projects and develop the bill of materials for the project.
3. Demonstrate ability to properly follow WPS (Welding Procedure Specification) during fabrication.

WELD 1191. Welded Art
3 Credits (1+4P)
Students explore the possibilities of welded art.
Prerequisite: WELD 1110.
Learning Outcomes
1. Demonstrate knowledge of the different forms of welded art.

WELD 1210. Flux Cored Arc Welding
3 Credits (2+2P)
Principles of flux cored arc welding (FCAW) terminology, safety procedures, and equipment set-up. Students will practice welding structural joints in all positions using the FCAW process.
Learning Outcomes
1. Demonstrate the set up of FCAW equipment.
2. Demonstrate safe operations of FCAW equipment.
3. Demonstrate minor repairs/maintenance of equipment.
4. Perform FCAW welds to minimum required specifications.

WELD 1220. Pipe Welding I
3 Credits (2+2P)
Stresses the theory and practical application of pipe welding in the 1-G and 2-G positions. This course will develop skills in the fit-up and technique of welding pipe, using electrodes and various Welding process.

Prerequisite(s): WELD 1130, WELD 1140, and WELD 1155, or consent of instructor.

Learning Outcomes

1. Demonstrate an understanding of 1-G and 2-G pipe welding using a variety of pipe sizes.
2. Demonstrate the ability to produce destructive test samples to AWS and/or API standards.
3. Demonstrate the ability to prepare, fit and tack pipe to specifications, getting pipe ready to weld.
4. Demonstrate knowledge of appropriate pipe fitting terminology and calculations.

WELD 1310. Metallurgy
3 Credits (3)

This course includes a study of ferrous and nonferrous metals from ore to the finished products. Emphasis is placed on metal alloys, heat-treating, hard surfacing, welding techniques, forging, foundry processes, and mechanical properties of metal including hardness, machinability, and ductility. Technical terms used in the various phases of metallurgy, from early history to present.

Prerequisites: WELD 1130 or consent of instructor.

Learning Outcomes

1. Describe metals and alloys commonly used in industry.
2. Describe mechanical properties of metals including stresses and failures.
3. Describe the metalworking processes of casting, forming, and machining.
4. Describe the two basic processes, and state the four major purposes of heat treatment.

WELD 2130. SMAW (Shielded Metal Arc Welding) II
6 Credits (3+6P)

Reviews and builds upon SMAW-1 skills. Students will learn joint design and AWS standards for welder qualification testing. Continuation of WELD 1130. May be repeated up to 6 credits.

Prerequisite: WELD 1130.

Learning Outcomes

1. Meet AWS acceptance criteria for weld quality and destructive tests (bend test).

WELD 2155. GTAW-Gas Tungsten Arc Welding II
3 Credits (2)

A continuation of GTAW I. This course is designed to provide the student with the ability to setup, maintain and operate Gas Tungsten Arc Welding (GTAW) equipment safely. Develop skills to weld structural joints to bend tests standards utilizing various metals. Weld quality will be measured in accordance with American Welding Society standards.

Prerequisite: WELD 1155 or consent of instructor.

Learning Outcomes

1. Demonstrate the ability to perform increasingly complex welds.
2. Demonstrate the ability set up GTAW equipment for use, inspect equipment prior to use, perform minor maintenance, and identify potential hazards.
3. Demonstrate the ability to perform GTAW on various base metals in all positions.
4. Demonstrate the understanding of basic metallurgical differences in various base and filler metals.
5. Demonstrate an understanding of welding currents and power sources.

WELD 2220. Pipe Welding II
3 Credits (2+2P)

Stresses the theory and practical application of 5-G and 6-G pipe welding. This course will develop skills in the technique of pipe welding, using various Welding processes.

Prerequisite: WELD 2120.

Learning Outcomes

1. Demonstrate an understanding of 5-G and 6-G pipe welding using a variety of pipe sizes.
2. Demonstrate the ability to produce destructive test samples to AWS and/or API standards.
3. Demonstrate the ability to prepare, fit and tack pipe to specifications, getting pipe ready to weld.
4. Demonstrate knowledge of appropriate pipe fitting terminology and calculations.

WELD 2290. Welder Qualifications
6 Credits (3+6P)

Laboratory and classroom instruction on AWS and ASME Welder Performance Qualification Tests. All position plate and pipe techniques and tests for SMAW, GMAW, GTAW, FCAW, and SAW. Nondestructive and destructive examination methods, and basics of welding codes. Restricted to Welding majors.

Prerequisites: OETS 104 or OETS 118; and WELD 1130, WELD 1120, WELD 1310, WELD 1140, WELD 1155, WELD 1210 and WELD 2155 or consent of instructor.

Learning Outcomes

1. Pass the AWS and ASME Welder Performance Qualification Tests in all processes and all positions.
2. Recognize the role of welding inspection and testing in industry.
3. Identify essential information for welding procedure and performance qualification.
4. Identify essential welding and inspection information from Welding Procedure Specifications (WPS's).
5. Identify essential welding and inspection information from AWS D1 1, Structural Welding Code — Steel.
6. Identify essential welding and inspection information from ASME, Boiler and Pressure Vessel Code - Section IX.
7. Describe the basic principles of non-destructive testing methods.

WELD 2995. Cooperative Education in Welding
1-6 Credits

Supervised cooperative work program. Student is employed in an approved occupation and supervised and rated by the employer and instructor. Student will meet in a weekly class. May be repeated up to 6 credits.

Learning Outcomes

1. Varies.

WELD 2996. Topics in Welding
1-6 Credits

Individual studies in areas of welding technology. May be repeated up to 12 credits.

Learning Outcomes

1. Varies.

WELD 2997. Independent Study
1-4 Credits

Individual Studies related to Welding.

Learning Outcomes

1. Varies.